

Remarks

Applicants gratefully acknowledge the courtesy extended by Examiner Olsen to Applicants' representatives, Michael A. Makuch and Mary A. Montebello, in a telephonic Examiner Interview held on July 6, 2007.

Claims 1-5 and 7-12 are pending herein. By this Amendment, claims 1 and 7 have been amended, and claims 6 and 13-15 have been canceled.

Claim 1 has been amended to include the contents of canceled claims 6 and 14 therein. Claim 7 has been amended to include the contents of canceled claims 13 and 15 therein.

Applicants submit that the amendments herein do not raise new issues. Accordingly, Applicants respectfully request entry of this Amendment.

In the Final Office Action, claims 1-13 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,326,302 to Joubert ("Joubert") in view of U.S. Patent No. 6,869,542 to Desphande ("Desphande") and further in view of U.S. Patent No. 6,069,090 to Eriguchi ("Eriguchi").

In view of the amendments and remarks herein, Applicants respectfully request reconsideration and withdrawal of the rejection set forth in the Final Office Action.

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Applicants respectfully submit that claims 1-5 and 7-12 would not have been obvious over Joubert in view of Desphande and further in view of Eriguchi.

As noted above, claim 1 has been amended to include the contents of canceled claims 6 and 14, and claim 7 has been amended to include the contents of canceled claims 13 and 15. Thus, both claims 1 and 7 now include the following features:

- (i) the etching method is carried out by a capacitively coupled plasma etching system, which forms a high-frequency electric field between a pair of opposed electrodes disposed in the processing vessel to generate the plasma; and
- (ii) the distance between the electrodes is such that a distance between a first of said electrodes and a wafer disposed on a second of said electrodes is from 30 to 90 mm.

As a result of features (i) and (ii) above, a plasma of the etching gas can be securely generated between the two electrodes. Therefore, the CD shift value of etching can be securely and precisely controlled by adjusting a flow ratio of the O₂ gas to the NH₃ gas.

Neither Joubert, Desphande nor Eriguchi teaches features (i) and (ii) above.

According to the Final Office Action and the Advisory action, Joubert teaches the use of conventional etching sources, with specific mention of LAM TCP and Applied Material PDS reactors. The Examiner takes official notice in the Office Action that conventional etching sources, particularly the reactors named in Joubert, have an electrode spacing within the claimed 30-90 mm range.

Joubert teaches the use of an induction coil coupled plasma etching system, wherein plasma is formed by using an induction coil. In such a system, the lower electrode of the system has nothing to do with the formation of the plasma. That is to say, the distance between the upper electrode (the first electrode) and the lower electrode (the second electrode) in the induction coil coupled plasma etching system is not selected based on whether a plasma will be formed.

On the other hand, in Applicants' claimed method, because a plasma is to be formed between the first and second electrodes in a capacitively coupled plasma etching system, the distance between the first electrode and the wafer disposed on the second electrode is an important factor in forming the plasma. In addition, the instant specification teaches at page 20, lines 3-9, that a capacitively coupled plasma etching system is preferred over other etching systems, including inductively-coupled type etching systems, "from a viewpoint of obtaining a higher etching selectivity at a suitable plasma density." Thus, the particular plasma etching system used in Applicants' claimed etching method is a significant feature of the claimed method.

Joubert does not teach or suggest the use of a capacitively coupled plasma etching system, and does not teach or suggest the combination of using a capacitively coupled plasma etching system and a distance between electrodes such that a distance between a first of said electrodes and a wafer disposed on a second of said electrodes is from 30 to 90 mm. Desphande and Eriguchi do not cure these deficiencies.

According to the Advisory Action, "the induction coil of the LAM TCP and the Applied Materials PDS reactors is a source of capacitive coupling". Applicants respectfully submit that while TCP and PDS reactors may have a capacitive component, these reactors are not capacitively coupled plasma etching systems but rather are induction coil coupled plasma etching systems.

Furthermore, the Advisory Action states that the gap between the electrodes is a "known cause-effective variable and optimization of this parameter is well within the level of ordinary skill." Applicants respectfully submit that none of the references cited in the Office Action discloses, in connection with a capacitively coupled plasma etching system, the relationship between the distance between the first electrode and the wafer on the second electrode, and how to generate plasma of an etching gas in accordance with that distance. As discussed above, in Applicants' claimed method, the distance between the first electrode and the wafer disposed on the second electrode is an important factor in forming the plasma because the plasma is to be formed between the first and second electrodes in a capacitively coupled plasma etching system.

Thus, for at least the reasons set forth above, Applicants respectfully submit that claims 1-5 and 7-12 would not have been obvious over Joubert in view of Desphande and further in view of Eriguchi.

In view of the amendments and remarks herein, Applicants respectfully request that the rejection set forth in the Office Action be withdrawn and that claims 1-15 be allowed.

If any additional fees are due in connection with the filing of this paper, such as fees under 37 C.F.R. §§1.16 or 1.17, please charge the fees to Deposit Account 02-4300; Order No. 033082M239.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP



Michael A. Makuch – Registration No. 32,263
1130 Connecticut Avenue, NW – Suite 1130
Washington, DC 20036
Tel : 202 263 4300
Fax : 202 263 4329

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MAM/MM/cvj

Enclosures: (1) Request for Continued Examination
(2) Check for the sum of \$810